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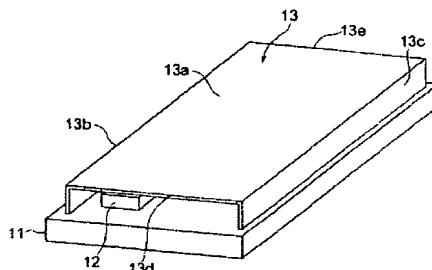
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(54) 【発明の名称】シールドキャップ付電子部品

(57) 【要約】 (修正有)

【課題】電子部品の小型化に対応でき、しかも外部応力が作用したり位置ずれが生じても短絡故障の発生を未然に防止できるシールドキャップ付電子部品を提供する。

【解決手段】上面に電子部品素子12の装着される回路基板11と、回路基板11の上面又は側面に接着又は固着され回路基板上の電子部品素子12を覆うようにされた金属シールドキャップ本体13とを有するシールドキャップ付電子部品において、金属シールドキャップ本体13が天井壁部分13aと、回路基板の上面又は側面に接着又は固着される一対の対向側壁部分13b, 13cとを備え、天井壁部分13aと一対の対向側壁部分13b, 13cと回路基板11とで形成される開口部14を備えている。



【特許請求の範囲】

【請求項1】

上面に電子部品素子の装着される回路基板と、該回路基板の上面又は側面に接着又は固着され回路基板上の電子部品素子を覆うようにされた金属シールドキャップ本体とを有するシールドキャップ付電子部品において、前記金属シールドキャップ本体が天井壁部分と、前記回路基板の上面又は側面に接着又は固着される一対の対向側壁部分を備え、前記天井壁部分と前記一対の対向側壁部分と前記回路基板とで形成される開口部を備えていることを特徴とするシールドキャップ付電子部品。

【請求項2】

前記開口部が対向していることを特徴とする請求項1に記載のシールドキャップ付電子部品。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】

本発明は、VCOやアンテナスイッチ電子部品などのシールドキャップ付電子部品に関するものである。

【0002】

【従来の技術】

高周波で使用される配線基板には、電磁波ノイズを遮蔽したり、塔載素子を保護するために金属材料から成るシールドキャップが実装面上に装着される。この種の従来例としては図7に示すように、シールドキャップ1は周囲にフランジ1aを備え、上面に電子部品素子2の装着された多層セラミック基板やプリント基板等の回路基板3の上面周縁部にフランジ1aを接着又は固着するようにしたものが知られている(特開平4-216652号公報、特公平8-15236号公報参照)。

【0003】

ところで、このような回路基板は、家電製品、無線通信機器及びコンピュータなどに用いられるVCOなどの電子部品、ハイブリッドICなどのパッケージに用いられ、これらの機器の小型化の傾向に則してますます小型化が進んでいる。しかし、上記のようなフランジ付きシールドキャップでは、電子部品素子2の装着される回路基板の上面の周縁部にフランジを固着するため、フランジの固着面積分だけ回路基板を大きく作らなければならず、回路基板の小型化の妨げとなっていた。言換えれば、上面積が同じであるとすると、回路基板の上面に装着できる電子部品素子2の数及び大きさが制限されることになる。

【0004】

そこで、図8に示すように、フランジ無しの箱型のシールドキャップ4を用い、その周縁側部のうち対向した二つの側部の縁部4aを電子部品素子5の装着される回路基板6の上面に接着又は固着して回路基板6の上面のスペースの犠牲となる部分を少なくしたもののが提案されてきた(特開2001-15976号公報参照)。同様

な観点で、図9には箱型のシールドキャップ7の周縁側部を回路基板8の側面に機械的嵌合手段9により固定するようにして回路基板8の上面のスペースの犠牲となる部分を少なくするようにした構成が示されている(特開平5-206308号公報参照)。

【0005】

【発明が解決しようとする課題】

図8及び図9に示すような構造のシールドキャップは、回路基板の上面のスペースの犠牲を低減できしかも電磁波ノイズの遮蔽や電子部品素子の保護の観点では十分であるが、金属シールドキャップは外部応力が作用すると変形し易すかつたり、組立て工程において回路基板上に金属シールドキャップを位置決めする際に位置ずれが生じ易い。そのため金属シールドキャップが図10及び図11に示すように回路基板上の電子部品素子と接触して短絡故障を引き起こすという問題が生じ得る。

【0006】

また、電子部品の小型化に伴い、インダクタやコンデンサ等の部品を回路基板上に実装できる領域も小さくなつてきており、そのため回路基板上に実装された部品素子とシールドキャップとが接触し、RF特性上問題となる。

【0007】

そこで、本発明は、電子部品の小型化に対応でき、しかも外部応力が作用したり位置ずれが生じても短絡故障の発生を未然に防止できるシールドキャップ付電子部品を提供することを目的としている。

【0008】

【課題を解決するための手段】

30 上記の目的を達成するために、本発明によれば、上面に電子部品素子の装着される回路基板と、回路基板の上面又は側面に接着又は固着され回路基板上の電子部品素子を覆うようにされた金属シールドキャップ本体とを有するシールドキャップ付電子部品において、金属シールドキャップ本体が天井壁部分と、回路基板の上面又は側面に接着又は固着される一対の対向側壁部分とを備え、天井壁部分と一対の対向側壁部分と回路基板とで形成される開口部を備えていることを特徴としている。

【0009】

40 好ましくは開口部は対向して形成されている。

【0010】

【発明の実施の形態】

以下、添付図面の図1～図6を参照して本発明の実施の形態について説明する。

図1～図3には、本発明の一実施の形態を示し、11は回路基板であり、その上面には、例えばトランジスタ、ダイオード、チップ型コンデンサ、チップ型抵抗、チップ型コイル、ICなどの複数個の電子部品素子12が装着されている。回路基板11は、誘電体セラミック

50 材料、ガラス・セラミック材料、低温焼成セラミック材

料やガラス・エポキシ複合材料等で構成されている。また13はシールドキャップ本体であり、金属材料により断面コの字型に構成され、天井壁部分13aと、横方の対向側壁部分と13b、13cとを備えている。シールドキャップ本体13の前後の対向端部13d、13eは開放している。シールドキャップ本体13は、横方の対向側壁部分と13b、13cの先端部を例えば接着剤又はろう材或いは半田により回路基板11の上面に接着又は固着することにより取り付けられ、回路基板11の上面におけるそれぞれの電子部品素子12を覆うように構成されている。シールドキャップ本体13の前後の対向開放端部13d、13eは、図示したように、シールドキャップ本体13を回路基板11の上面に取り付けた際に、回路基板11の上面との間に開口部14が画定され、これらの開口部14は、シールドキャップ本体13を回路基板11の上面に固着する際の対流伝熱効果やガス抜け性を良好にしたり、シールドキャップ本体13の接着又は固着時に発生する応力集中を緩和する働きをする。

【0011】

このように構成することにより、回路基板11の上面に接着又は固着されるシールドキャップ本体13が外部応力を受けて変形したりそれでも、前後の対向端部13d、13eが開放しているので、シールドキャップ本体13は回路基板11の上面上で前後の対向端部13d、13eの近くに位置している電子部品素子12と接触することがなく、シールドキャップ本体13と電子部品素子12との絶縁状態は保持される。

【0012】

また、前後の対向端部13d、13eが開放していることにより、回路基板11の上面上でシールドキャップ本体13は前後の対向端部13d、13eと電子部品素子12との間の隙間は必要最小限の寸法にすることができる、電子部品の小型化に対応できるようになる。

【0013】

さらに、シールドキャップ本体13は回路基板11の上面に実装される電子部品素子12の高さに応じて設計すればよく、種々の高さのものに容易に適応させることができる。

【0014】

図4～図6には本発明の別の実施の形態を示す。この実施の形態において、図1～図3に示すものと対応した要素は同じ符号で示す。図4～図6には本発明の別の実施の形態では、シールドキャップ本体13は、横方の対向側壁部分と13b、13cの先端部を例えば接着剤又はろう材或いは半田により回路基板11の側面に接着又は固着することにより取り付けられている。その他の構成は図1～図3に示す実施の形態の場合と実質的に同様である。すなわち、シールドキャップ本体13の前後の対向端部13d、13eは、それぞれ、開放しており、從

って、例えば外部応力の作用でシールドキャップ本体13が変形したり、回路基板11の上面に対して所定の位置からずれても、シールドキャップ本体13はその前後の対向端部13d、13eの近くに位置している電子部品素子12と接触せず、電気的に絶縁された状態に保持される。

【0015】

上記二つの実施の形態では、シールドキャップ本体13の横方の対向側壁部分13b、13cが回路基板11の上面又は側面に接着又は固着されている場合を例示したが、代りにシールドキャップ本体13の横方の対向側壁部分13b、13cを開放して開口部とし、前後の対向側部を側壁部分として構成し、回路基板11の上面又は側面に接着又は固着するようにしてもよい。その場合にも当然上記したものと同様な効果が得られる。

【0016】

【発明の効果】

以上説明してきたように、本発明によるシールドキャップ付電子部品においては、金属シールドキャップ本体が

天井壁部分と、回路基板の上面又は側面に接着又は固着される一対の対向側壁部分とを備え、天井壁部分と一対の対向側壁部分と回路基板とで形成される開口部を備えているので、回路基板に対してシールドキャップ本体が位置ずれしたり外部応力によりシールドキャップ本体が変形しても、シールドキャップ本体と回路基板上の電子部品素子との接触は避けられ、短絡故障の発生を未然に防止することができると共に、電子部品の小型化に対応できるという効果を奏すことができる。また、金属シールドキャップ本の一対の対向側壁部分の高さを変えるだけで、回路基板の上面の実装電子部品素子の種々の高さに適応できる。

【図面の簡単な説明】

【図1】本発明によるシールドキャップ付電子部品の一実施の形態を示す要部の概略斜視図。

【図2】図1のシールドキャップ付電子部品の長手方向概略部分断面側面図。

【図3】図1のシールドキャップ付電子部品の概略横断面図。

【図4】本発明によるシールドキャップ付電子部品の別の実施の形態を示す要部の概略斜視図。

【図5】図4のシールドキャップ付電子部品の長手方向概略部分断面側面図。

【図6】図4のシールドキャップ付電子部品の概略横断面図。

【図7】従来のシールドキャップ付電子部品の一例を示す概略斜視図。

【図8】従来のシールドキャップ付電子部品の別の例を示す概略斜視図。

【図9】従来のシールドキャップ付電子部品の別の例を示す概略斜視図。

【図10】従来のシールドキャップ付電子部品における短絡故障の発生状態を示す概略断面図。

【図11】従来のシールドキャップ付電子部品における短絡故障の発生状態を示す概略断面図。

【符号の説明】

11：回路基板

12：電子部品素子

5

13：シールドキャップ本体

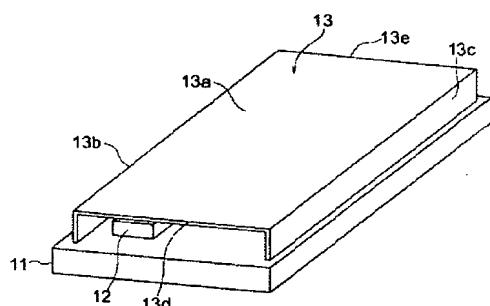
13a：シールドキャップ本体の天井壁部分

13b、13c：シールドキャップ本体の横方の対向側壁部分

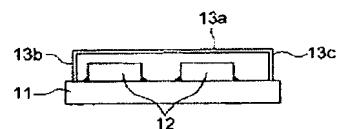
13d、13e：シールドキャップ本体の前後の対向開放端部

14：開口部

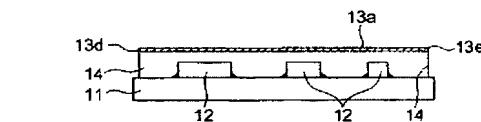
【図1】



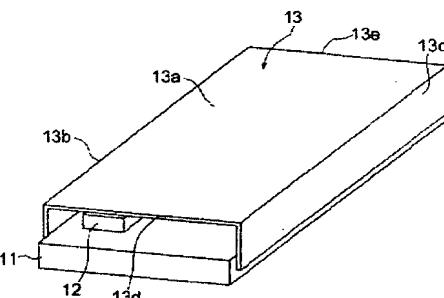
【図3】



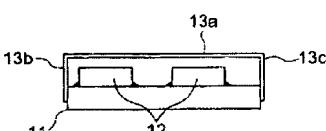
【図5】



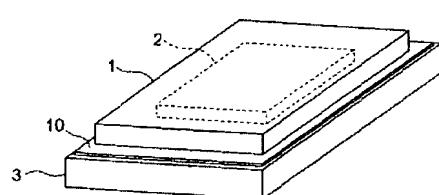
【図4】



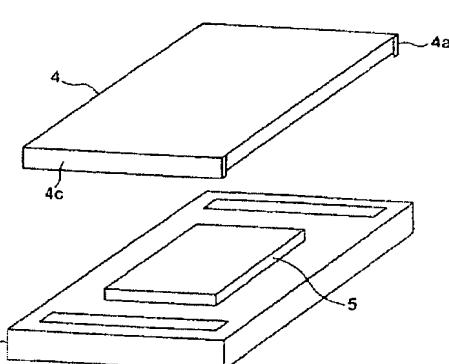
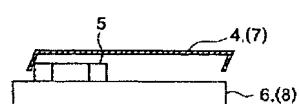
【図6】



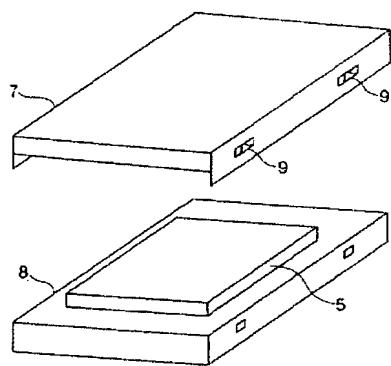
【図7】



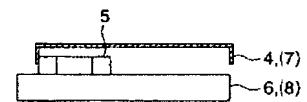
【図10】



【図9】



【図11】



PATENT ABSTRACTS OF JAPAN

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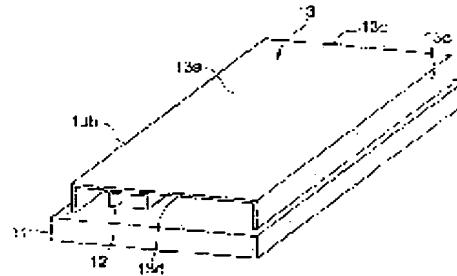
(21)Application number : 2002-173927 (71)Applicant : NGK SPARK PLUG CO LTD
 (22)Date of filing : 14.06.2002 (72)Inventor : KAMAFUCHI KOJI

(54) ELECTRONIC COMPONENT WITH SHIELDING CAP

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electronic component with a shielding cap which is adaptive to size reduction in the number of the electronic components and can prevent short-circuit defects, even if external stress acts or displacement exists.

SOLUTION: The electronic component with the shielding cap has a circuit board 11, which has an electronic component element 12 mounted on its top surface and a metal shielding cap body 13, which is bonded or fixed to the top surface or flank of the circuit board 11 to cover the electronic component element 12 on the circuit board; and the metal shielding cap body 13 is equipped with a ceiling wall part 13a, a couple of opposite sidewall parts 13b and 13c bonded or fixed to the top surface or flank of the circuit board and is further equipped with an opening 14, which is formed of the ceiling wall part 13a, a pair of opposite side wall parts 13b and 13c, and circuit board 11.



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[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1]

In the electronic parts with a shielding cap which have the circuit board by which a top face is equipped with an electronic-parts component, and the body of a metal shielding cap paste up or fix [body] on the top face or side face of this circuit board, and it is made to have an electronic-parts component on the circuit board covered with it Said body of a metal shielding cap is equipped with a part for a part for a head-lining wall, and the pair opposite side wall of the couple which pastes up or fixes on the top face or side face of said circuit board. Electronic parts with a shielding cap characterized by having opening formed by part for a part for said head-lining wall, and the pair opposite side wall of said couple, and said circuit board.

[Claim 2]

Electronic parts with a shielding cap according to claim 1 characterized by said opening having countered.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]****[Field of the Invention]**

This invention relates to electronic parts with a shielding cap, such as VCO and antenna switch electronic parts.

[0002]**[Description of the Prior Art]**

It is equipped with the shielding cap which changes from a metallic material to the wiring substrate used by the RF in order to cover an electromagnetic wave noise or to protect a **** component on a component side. As shown in drawing 7 as this kind of a conventional example, a shielding cap 1 equips a perimeter with flange 1a, and what pasted up or fixed flange 1a in the top-face periphery section of the circuit boards 3, such as a multilayered ceramic substrate and a printed circuit board, by which the top face was equipped with the electronic-parts component 2 is known (refer to JP,4-216652,A and JP,8-15236,B).

[0003]

By the way, such the circuit board is used for packages, such as electronic parts, such as VCO used for home electronics, a radiocommunication device, a computer, etc., and a hybrid IC, it ** in the inclination of a miniaturization of these devices, and the miniaturization is progressing increasingly. However, in the above collar-head shielding caps, in order to fix a flange at the perimeter edge of the top face of the circuit board where it is equipped with the electronic-parts component 2, only the root face integral of a flange had to make the circuit board greatly, and had become the hindrance of a miniaturization of the circuit board. Supposing in other words a top-face product is the same, the number and magnitude of the electronic-parts component 2 with which the top face of the circuit board can be equipped will be restricted.

[0004]

Then, as shown in drawing 8 , what lessened the part which pastes up or fixes and falls victim to the tooth space of the top face of the circuit board 6 on the top face of the circuit board 6 where the electronic-parts component 5 is equipped with edge 4a of two flanks which countered among the perimeter flank has been proposed using the shielding cap 4 of a core box without a flange (refer to JP,2001-15976,A). The configuration which was made to lessen the part which falls victim to the tooth space of the top face of the circuit board 8 in the same viewpoint as fixes the perimeter flank of the shielding cap 7 of a core box to drawing 9 with the mechanical fitting means 9 on the side face of the circuit board 8 is shown (refer to JP,5-206308,A).

[0005]**[Problem(s) to be Solved by the Invention]**

by the ability of the shielding cap of structure as show in drawing 8 and drawing 9 reduce the sacrifice of the tooth space of the top face of the circuit board , moreover , although electric shielding of an electromagnetic wave noise and the viewpoint of protection of an electronic parts component be enough , in case a metal shielding cap will deform if external force act , and it position a metal shielding cap on the circuit board in **** and an assembly process , a location gap tend to produce it . Therefore, the problem of contacting the electronic-parts

component on the circuit board, and causing closed-circuit failure as a metal shielding cap shows drawing 10 and drawing 11 may arise.

[0006]

Moreover, the components component and shielding cap which the field which can mount components, such as an inductor and a capacitor, on the circuit board was also becoming small with the miniaturization of electronic parts, therefore were mounted on the circuit board contact, and it becomes RF property top problem.

[0007]

Then, this invention can respond to the miniaturization of electronic parts, and even if external force moreover acts or a location gap arises, it aims at offering the electronic parts with a shielding cap which can prevent generating of closed-circuit failure beforehand.

[0008]

[Means for Solving the Problem]

The circuit board by which a top face is equipped with an electronic-parts component according to this invention in order to attain the above-mentioned object, In the electronic parts with a shielding cap which have the body of a metal shielding cap paste up or fix [body] on the top face or side face of the circuit board, and it is made to have an electronic-parts component on the circuit board covered with it The body of a metal shielding cap is characterized by having had a part for a part for a head-lining wall, and the pair opposite side wall of the couple which pastes up or fixes on the top face or side face of the circuit board, and having opening formed by part for a part for a head-lining wall, and the pair opposite side wall of a couple, and the circuit board.

[0009]

Preferably, opening counters and is formed.

[0010]

[Embodiment of the Invention]

Hereafter, the gestalt of operation of this invention is explained with reference to drawing 1 of an accompanying drawing – drawing 6 .

The gestalt of 1 operation of this invention is shown in drawing 1 – drawing 3 , and 11 is the circuit board and it is equipped with two or more electronic-parts components 12, such as a transistor, diode, a chip mold capacitor, chip mold resistance, a chip mold coil, and IC, on the top face. The circuit board 11 consists of a dielectric ceramic ingredient, a glass ceramic ingredient, a low-temperature baking ceramic ingredient, glass epoxy composite material, etc. Moreover, 13 is a body of a shielding cap, was constituted by the character type of cross-section KO with the metallic material, and is equipped with a part for the pair opposite side wall of the method of width, and 13b and 13c. [head-lining wall part 13a, and] The opposite edges 13d and 13e before and behind the body 13 of a shielding cap are opened. In a part for the pair opposite side wall of the method of width, and the point of 13b and 13c, it is attached by pasting up or fixing on the top face of the circuit board 11 with adhesives, wax material, or solder, and the body 13 of a shielding cap is constituted so that each electronic-parts component 12 in the top face of the circuit board 11 may be covered. The opposite open end sections 13d and 13e before and behind the body 13 of a shielding cap As illustrated, when the body 13 of a shielding cap is attached in the top face of the circuit board 11, opening 14 is demarcated between the top faces of the circuit board 11. These openings 14 The convective-heat-transfer effectiveness and outgassing nature at the time of fixing the body 13 of a shielding cap on the top face of the circuit board 11 are made good, or it serves to ease the stress concentration generated at the time of adhesion of the body 13 of a shielding cap, or fixing.

[0011]

Thus, since the opposite edges 13d and 13e of order have opened even if the body 13 of a shielding cap which pastes up or fixes deforms into the top face of the circuit board 11 in response to external force or shifts to it by constituting The body 13 of a shielding cap does not contact the electronic-parts component 12 located near the opposite edges 13d and 13e of order on the top face of the circuit board 11, and the insulating condition of the body 13 of a shielding cap and the electronic-parts component 12 is held.

[0012]

Moreover, when the opposite edges 13d and 13e of order have opened, the body 13 of a shielding cap can make the clearance between the opposite edges 13d and 13e of order, and the electronic-parts component 12 a necessary minimum dimension on the top face of the circuit board 11, and it can respond to the miniaturization of electronic parts.

[0013]

Furthermore, the body 13 of a shielding cap can be easily fitted to the thing of various height that what is necessary is just to design according to the height of the electronic-parts component 12 mounted on the top face of the circuit board 11.

[0014]

The gestalt of another operation of this invention is shown in drawing 4 – drawing 6. In the gestalt of this operation, the same sign shows what is shown in drawing 1 – drawing 3, and the corresponding element. With the gestalt of another operation of this invention, the body 13 of a shielding cap is attached in drawing 4 – drawing 6 by pasting up or fixing a part for the pair opposite side wall of the method of width, and the point of 13b and 13c on the side face of the circuit board 11 with adhesives, wax material, or solder. Other configurations are substantially [as the case of the gestalt of operation shown in drawing 1 – drawing 3] the same. That is, the opposite edges 13d and 13e before and behind the body 13 of a shielding cap are opened, respectively, therefore even if the body 13 of a shielding cap deforms or it shifts from a position to the top face of the circuit board 11 in an operation of external force, the body 13 of a shielding cap does not contact the electronic-parts component 12 located near the opposite edges 13d and 13e before and behind it, but is held at the condition of having insulated electrically.

[0015]

Although the case where the amount of [of the method of width of the body 13 of a shielding cap / 13b and 13c] pair opposite side wall had pasted up or fixed on the top face or side face of the circuit board 11 was illustrated with the gestalt of two above-mentioned implementation Parts for the pair opposite side wall 13b and 13c of the method of width of the body 13 of a shielding cap are opened instead, it considers as opening, the pair opposite side section of order is constituted as a side-attachment-wall part, and you may make it paste up or fix on the top face or side face of the circuit board 11. Also in such a case, the same effectiveness as what was naturally described above is acquired.

[0016]

[Effect of the Invention]

In electronic parts with a shielding cap according to this invention as explained above Since the body of a metal shielding cap was equipped with a part for a part for a head-lining wall, and the pair opposite side wall of the couple which pastes up or fixes on the top face or side face of the circuit board and is equipped with opening formed by part for a part for a head-lining wall, and the pair opposite side wall of a couple, and the circuit board Even if the body of a shielding cap carries out a location gap or the body of a shielding cap deforms according to external force to the circuit board Contact for the body of a shielding cap and the electronic-parts component on the circuit board can do so the effectiveness that it can respond to the miniaturization of electronic parts while it is avoided and can prevent generating of closed-circuit failure beforehand. Moreover, it can be adapted for the various height of the mounting electronic-parts component on the top face of the circuit board only by changing the height for a pair opposite side wall of the couple of a metal shielding cap book.

[Brief Description of the Drawings]

[Drawing 1] The outline perspective view of an important section showing the gestalt of 1 operation of the electronic parts with a shielding cap by this invention.

[Drawing 2] The longitudinal direction outline partial cross-section side elevation of the electronic parts with a shielding cap of drawing 1.

[Drawing 3] The outline cross-sectional view of the electronic parts with a shielding cap of drawing 1.

[Drawing 4] The outline perspective view of an important section showing the gestalt of another

operation of the electronic parts with a shielding cap by this invention.

[Drawing 5] The longitudinal direction outline partial cross-section side elevation of the electronic parts with a shielding cap of drawing 4.

[Drawing 6] The outline cross-sectional view of the electronic parts with a shielding cap of drawing 4.

[Drawing 7] The outline perspective view showing an example of the conventional electronic parts with a shielding cap.

[Drawing 8] The outline perspective view showing another example of the conventional electronic parts with a shielding cap.

[Drawing 9] The outline perspective view showing another example of the conventional electronic parts with a shielding cap.

[Drawing 10] The outline sectional view showing the generating condition of the closed-circuit failure in the conventional electronic parts with a shielding cap.

[Drawing 11] The outline sectional view showing the generating condition of the closed-circuit failure in the conventional electronic parts with a shielding cap.

[Description of Notations]

11 : Circuit Board

12 : Electronic-Parts Component

13 : Body of Shielding Cap

13a: A part for the head-lining wall of the body of a shielding cap

13b, 13c: A part for the pair opposite side wall of the method of width of the body of a shielding cap

13d, 13e: The opposite open end section before and behind the body of a shielding cap

14 : Opening

[Translation done.]

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DESCRIPTION OF DRAWINGS

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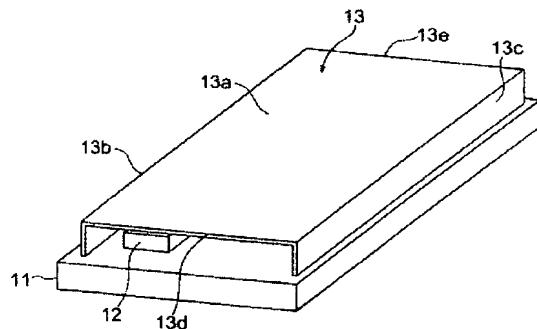
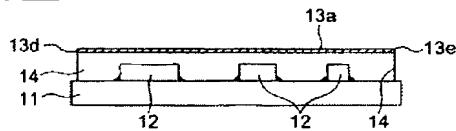
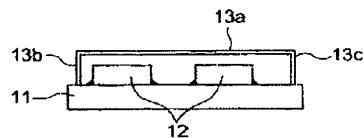
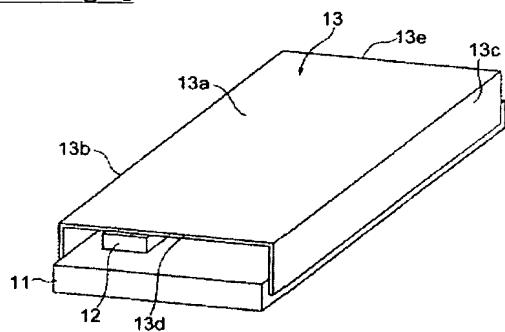
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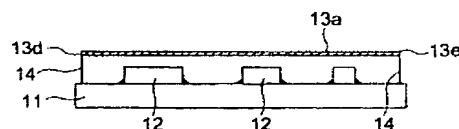
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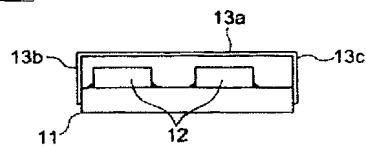
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DRAWINGS

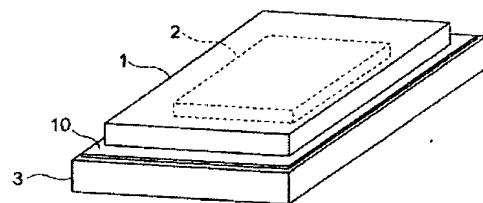
[Drawing 1]**[Drawing 2]****[Drawing 3]****[Drawing 4]****[Drawing 5]**



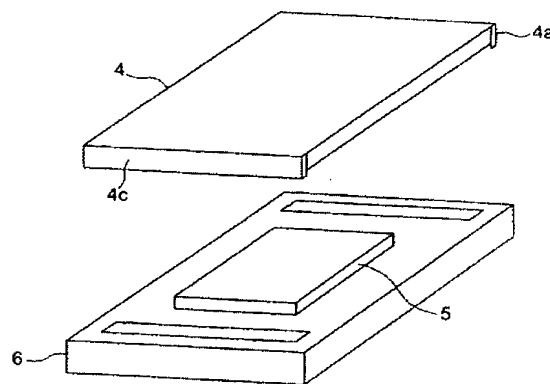
[Drawing 6]



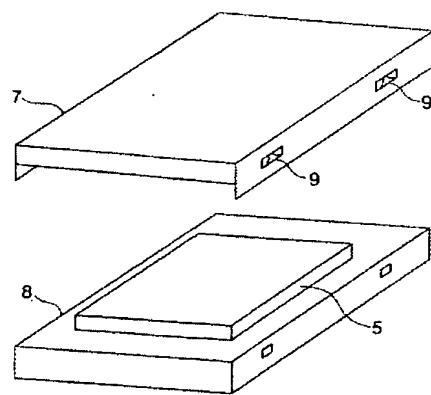
[Drawing 7]



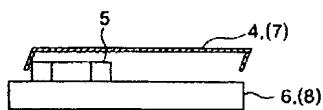
[Drawing 8]



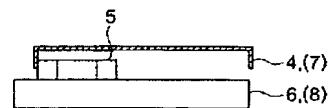
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]